

INTERNATIONAL RECTIFIER



1N3879, 1N3889, 6FL, 12FL, 16FL SERIES

6A, 12A and 16A Fast
Recovery Rectifiers

Major Ratings and Characteristics

| | 1N3879 -1N3883 | 1N3889 -1N3893 | 6FL... | 12FL... | 16FL... | Unit |
|-----------------------------|-------------------|-------------------|-----------|------------|------------|-------------------|
| I(F(AV)) [†] | 6* | 12* | 6 | 12 | 16 | A |
| IFSM | 50Hz 60Hz | 72 75* | 145 | 110 150 | 145 190 | A |
| I _z _t | 50Hz 60Hz | 26 23 | 103 | 60 55 | 103 94 | A ² s |
| $\sqrt{\frac{I_z}{t}}$ | 363 | 1452 | 855 | 1452 | 2290 | A ² /s |
| T _r range | see table | | | | ns | |
| V _{RRM} range | 50 - 400* | | 50 - 1000 | | V | |
| T _j range | -65 to 150 | | | | °C | |

* JEDEC registered values.

† At max. T_C = 100°C.

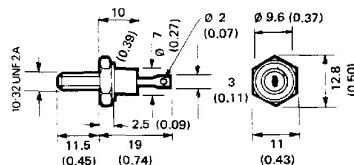
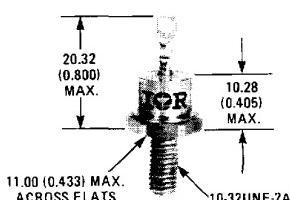
Description

This range of fast recovery diodes is designed for applications in DC power supplies, inverters, converters, choppers, ultrasonic systems and for use as free wheel diodes.

Features

- Short reverse recovery time
- Low stored charge
- Wide current range
- Excellent surge capabilities
- Standard JEDEC types
- Stud cathode and stud anode versions
- Types up to 1000V V_{RRM}
- Fully characterised reverse recovery conditions

CASE STYLE AND DIMENSIONS



Conforms to JEDEC : DO-203AA (DO-4)

IEC 191-2 : A3U

BS 3934 : SO-10A

DIN 41885 : 101 C 2

All dimensions in millimetres (inches)

REVERSE VOLTAGE RATINGS

| Part Number | ① ② | VR _{RM} — Max. Repetitive Peak Reverse Voltage | VR _{RM} — Max. Non-Repetitive Peak Reverse Voltage $t_p \leq 5$ ms | I _R — Max. Reverse Current At Rated VR | | |
|-------------|------------|---|--|--|------------------------|------------------------|
| | | | | T _J = 25°C | T _J = 100°C | T _J = 150°C |
| 1N3879 | | 50 | 75 | 0.015* | 1.0* | 3.0* |
| 1N3880 | | 100 | 150 | 0.015* | 1.0* | 3.0* |
| 1N3881 | | 200 | 250 | 0.015* | 1.0* | 3.0* |
| 1N3882 | | 300 | 350 | 0.015* | 1.0* | 3.0* |
| 1N3883 | | 400 | 450 | 0.015* | 1.0* | 3.0* |
| 1N3888 | | 50 | 75 | 0.025* | 3.0* | 5.0* |
| 1N3889 | | 100 | 150 | 0.025* | 3.0* | 5.0* |
| 1N3891 | | 200 | 250 | 0.025* | 3.0* | 5.0* |
| 1N3892 | | 300 | 350 | 0.025* | 3.0* | 5.0* |
| 1N3893 | | 400 | 450 | 0.025* | 3.0* | 5.0* |
| 6FL5S02 | 6FL5S05 | 6FL5S10 | 50 | 75 | 0.050 | — |
| 6FL10S02 | 6FL10S05 | 6FL10S10 | 100 | 150 | 0.050 | — |
| 6FL20S02 | 6FL20S05 | 6FL20S10 | 200 | 275 | 0.050 | — |
| 6FL40S02 | 6FL40S05 | 6FL40S10 | 400 | 500 | 0.050 | — |
| 6FL60S02 | 6FL60S05 | 6FL60S10 | 600 | 725 | 0.050 | — |
| — | 6FL80S05 | 6FL80S10 | 800 | 950 | 0.050 | — |
| — | 6FL100S05 | 6FL100S10 | 1000 | 1250 | 0.050 | — |
| 12FL5S02 | 12FL5S05 | 12FL5S10 | 50 | 75 | 0.050 | — |
| 12FL10S02 | 12FL10S05 | 12FL10S10 | 100 | 150 | 0.050 | — |
| 12FL20S02 | 12FL20S05 | 12FL20S10 | 200 | 275 | 0.050 | — |
| 12FL40S02 | 12FL40S05 | 12FL40S10 | 400 | 500 | 0.050 | — |
| 12FL60S02 | 12FL60S05 | 12FL60S10 | 600 | 725 | 0.050 | — |
| — | 12FL80S05 | 12FL80S10 | 800 | 950 | 0.050 | — |
| — | 12FL100S05 | 12FL100S10 | 1000 | 1250 | 0.050 | — |
| 16FL5S02 | 16FL5S05 | 16FL5S10 | 50 | 75 | 0.050 | — |
| 16FL10S02 | 16FL10S05 | 16FL10S10 | 100 | 150 | 0.050 | — |
| 16FL20S02 | 16FL20S05 | 16FL20S10 | 200 | 275 | 0.050 | — |
| 16FL40S02 | 16FL40S05 | 16FL40S10 | 400 | 500 | 0.050 | — |
| 16FL60S02 | 16FL60S05 | 16FL60S10 | 600 | 725 | 0.050 | — |
| — | 16FL80S05 | 16FL80S10 | 800 | 950 | 0.050 | — |
| — | 16FL100S05 | 16FL100S10 | 1000 | 1250 | 0.050 | — |

REVERSE RECOVERY CHARACTERISTICS

| | 1N3879 — 1N3883 | 6FL... | | | 12FL... | | | 16FL... | | | Unit | Conditions | |
|----------------------|------------------------------------|--------|-----|------|---------|------|------|---------|------|------|------|--|--|
| | | S02 | S05 | S10 | S02 | S05 | S10 | S02 | S05 | S10 | | | |
| t_{rr} | 150 | 150 | 110 | 285 | 490 | 100 | 250 | 430 | 90 | 225 | 390 | ns | $T_J = 25^\circ\text{C}, I_F = 1\text{ A to } V_R = 30\text{ V}$ $dI_F/dt = 100 \text{ A}/\mu\text{s}$ |
| | 300* | 300* | 200 | 500 | 1000 | 200 | 500 | 1000 | 200 | 500 | 1000 | ns | $T_J = 25^\circ\text{C}, dI_F/dt = 25 \text{ A}/\mu\text{s}$ |
| $I_{RM}(\text{REC})$ | Max. peak re- covery current | 4* | 5* | — | — | — | — | — | — | — | — | $I_{FM} = \pi \times \text{rated } I_F(\text{AV})$ | |
| | Max. reverse re- covered charge | 400 | 350 | 230 | 1700 | 5000 | 200 | 1300 | 3800 | 150 | 1100 | 3000 | $n\text{C}$ $T_J = 25^\circ\text{C}, I_F = 1\text{ A to } V_R = 30\text{ V}$ $dI_F/dt = 100 \text{ A}/\mu\text{s}$ |
| | 400 | 400 | 200 | 1200 | 5000 | 200 | 1200 | 5000 | 200 | 1200 | 5000 | nC | $T_J = 25^\circ\text{C}, dI_F/dt = 25 \text{ A}/\mu\text{s}$ $ I_{FM} = \pi \times \text{rated } I_F(\text{AV}) $ |

ELECTRICAL SPECIFICATIONS

| | 1N3879 — 1N3883 | 6FL... | 1N3889 — 1N3893 | 12FL... | 16FL... | Unit | Conditions |
|---------------------------|--|--------|--------------------|---------|---------|---|---|
| FORWARD CONDUCTION | | | | | | | |
| $I_F(\text{AV})$ | Max. average forward current | 6* | 6 | 12* | 16 | A | 180° conduction, half sine wave, $T_C = 100^\circ\text{C}$ |
| $I_F(\text{RMS})$ | Max. r.m.s. forward current | 9.5 | 9.5 | 19 | 25 | A | |
| I_{FSM} | Max. peak one-cycle non- repetitive forward current | 72 | 110 | 145 | 180 | A | $t = 10 \text{ ms}$ |
| | | 75* | 115 | 150* | 190 | | $t = 8.3 \text{ ms}$ With rated V_{RRM} |
| | | 85 | 130 | 170 | 215 | | $V_{RRM} = 0$ |
| | | 90 | 135 | 180 | 225 | | $t = 8.3 \text{ ms}$ |
| I^2t | Max. I^2t for fusing | 26 | 60 | 103 | 180 | $t = 10 \text{ ms}$ | With rated V_{RRM} |
| | | 23 | 55 | 94 | 150 | $t = 8.3 \text{ ms}$ | |
| | | 36 | 88 | 145 | 230 | $t = 10 \text{ ms}$ | $V_{RRM} = 0$ |
| | | 33 | 78 | 130 | 210 | $t = 8.3 \text{ ms}$ | |
| $I^2\sqrt{t}$ | Max. $I^2\sqrt{t}$ for individual device fusing | 363 | 856 | 1452 | 2290 | $I^2\sqrt{t} = 0.1 \text{ to } 10 \text{ ms}$ | |
| | | 1.5* | 1.5 | 1.5* | 1.5 | $V_T = 25^\circ\text{C}, I_F = \text{rated } I_F(\text{AV}) \text{ (D.C.)}$ | |
| V _{FM} | Max. peak forward voltage | 1.4* | 1.4 | 1.4* | 1.4 | $V_T = 100^\circ\text{C}, I_F = \text{rated } I_F(\text{AV})$ | |
| | | 1.5* | 1.5 | 1.5* | 1.5 | $V_T = 100^\circ\text{C}, I_F = \pi \times \text{rated } I_F(\text{AV})$ | |

*JEDEC registered value.

**Suffix "SO2" may be omitted, i.e., 12FL10 implies 12FL10S02,

12FL60 implies 12FL60S02.

①Types listed are cathode to case; for anode-to-case include "R" in code, i.e., 1N3879R, 6FLR20S10, 16FLR40S02.

① $I_{R(AV)}$ @ rated $I_F(\text{AV})$ and V_{RRM} , and $T_C = 100^\circ\text{C}$.② $I_{R(V)}$ @ rated V_{RRM} and $T_J = 150^\circ\text{C}$.③ I^2t for time $t_X = I^2\sqrt{t} + \sqrt{x}$

④ When these devices are ordered without a suffix, e.g., 40HFL, the order will be filled with devices that meet the SO2 specification.



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1N3879, 1N3889, 6FL, 12FL, 16FL Series

Thermal and mechanical specifications

| | 1N3879 -1N3883 6FL... | 1N3889 -1N3893 12FL... | 16FL... | Units | Conditions |
|-------------------|---|------------------------------|---------|---------|--|
| T _j | Junction operating temperature range | -65 to 150 | | °C | |
| T _{stg} | Storage temperature range | -65 to 175 | | °C | |
| R _{thJC} | Maximum internal thermal resistance, junction to case | 2.5 | 2.0 | 1.6 | deg C/W DC operation |
| R _{thCS} | Maximum thermal resistance, case to heatsink | | 0.5 | deg C/W | Mounting surface flat, smooth and greased. |
| T | Mounting torque to nut ±10% | 10.5 | | lbf.in | Lubricated threads |
| | | 0.12 | | kgf.m | (Non-lubricated threads) |
| | to device | 1.2 | | Nm | |
| | | 11.5 (13.5) | | lbf.in | |
| 0.13 (0.155) | | | kgf.m | | |
| wt | Approximate weight | 1.3 (1.35) | | Nm | |
| | | 0.25 | | oz | |
| | Case style | DO-203AA (DO-4) | | | JEDEC |

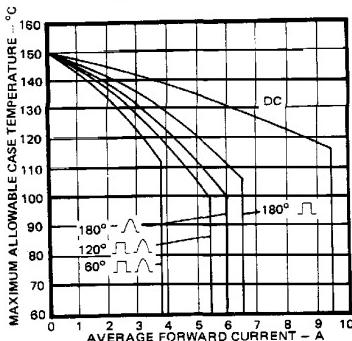


Fig. 1 — Average Forward Current Vs. Maximum Allowable Case Temperature, 1N3879 and 6FL Series

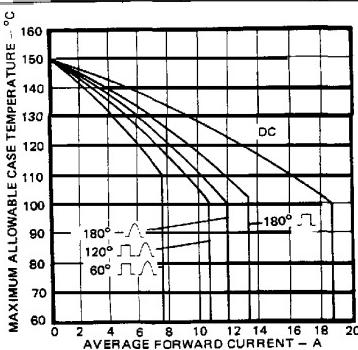


Fig. 2 — Average Forward Current Vs. Maximum Allowable Case Temperature, 1N3889 and 12FL Series

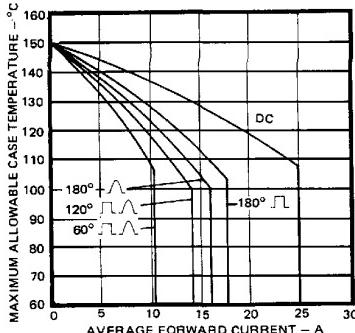


Fig. 3 — Average Forward Current Vs. Maximum Allowable Case Temperature, 16FL Series

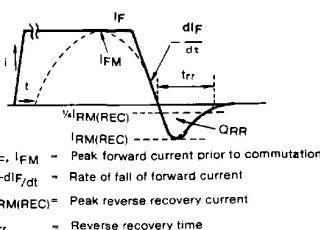


Fig. 4 — Reverse Recovery Time Test Waveform

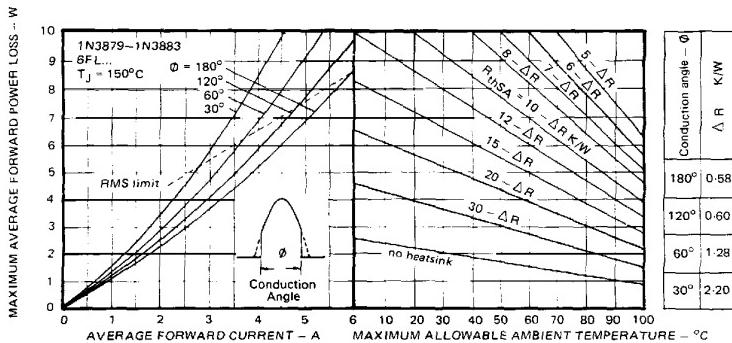


Fig. 5 – Current Rating Nomogram (Sinusoidal Waveforms), 1N3879 and 6FL Series

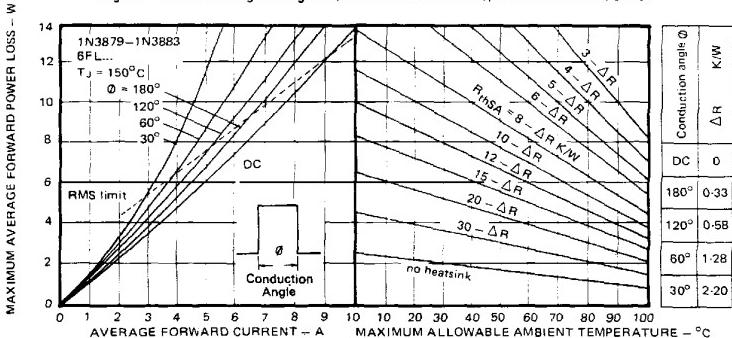


Fig. 6 – Current Rating Nomogram (Rectangular Waveforms), 1N3879 and 6FL Series

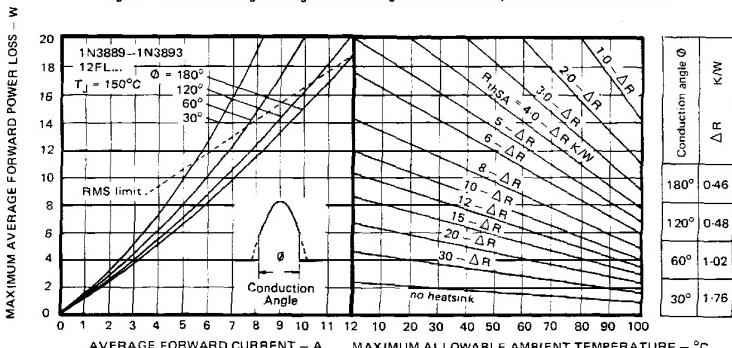


Fig. 7 – Current Rating Nomogram (Sinusoidal Waveforms), 1N3889 and 12FL Series

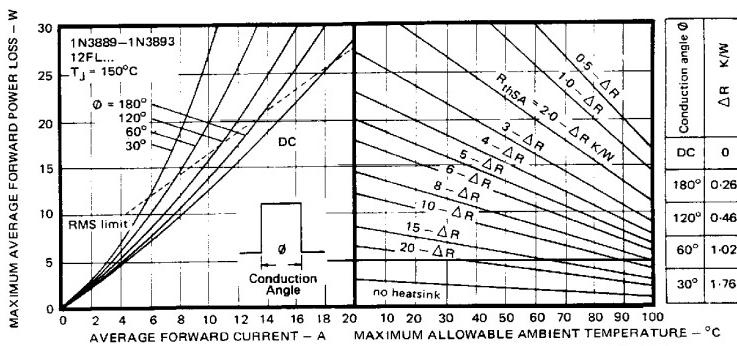


Fig. 8 — Current Rating Nomogram (Rectangular Waveforms), 1N3889 and 12FL Series

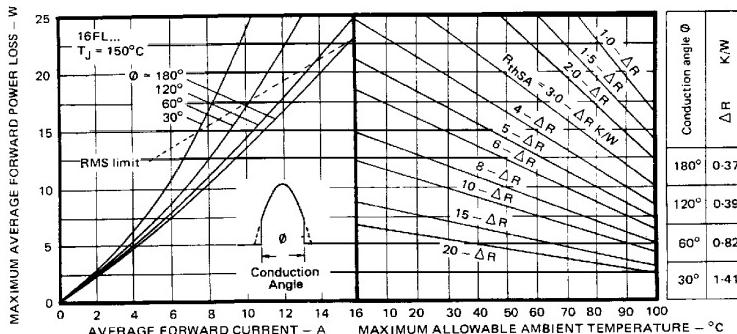


Fig. 9 — Current Rating Nomogram (Sinusoidal Waveforms), 16FL Series

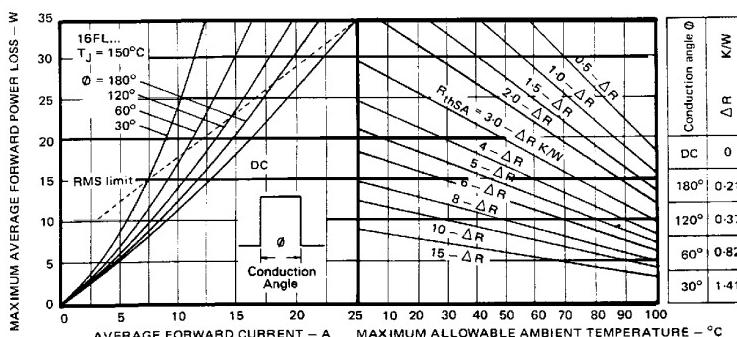


Fig. 10 — Current Rating Nomogram (Rectangular Waveforms), 16FL Series

1N3879, 1N3889, 6FL, 12FL, 16FL Series

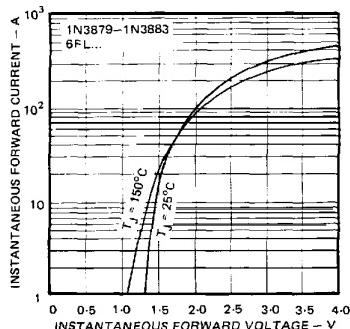


Fig. 11 — Maximum Forward Voltage Vs. Forward Current, 1N3879 and 6FL Series

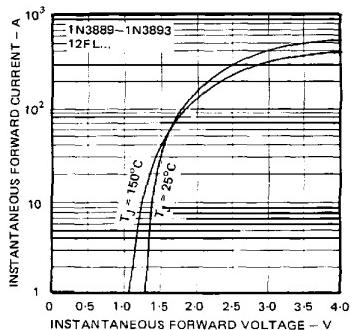


Fig. 13 — Maximum Forward Voltage Vs. Forward Current, 1N3889 and 12FL Series

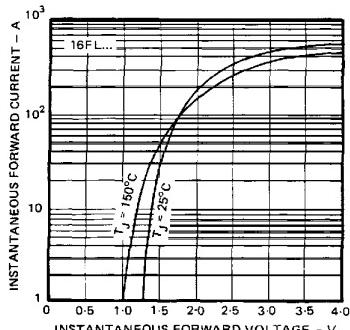


Fig. 15 — Maximum Forward Voltage Vs. Forward Current, 16FL Series

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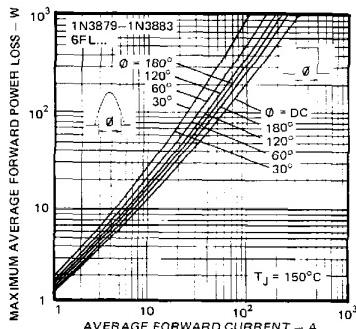


Fig. 12 — Maximum High Level Forward Power Loss Vs. Average Forward Current, 1N3879 and 6FL Series

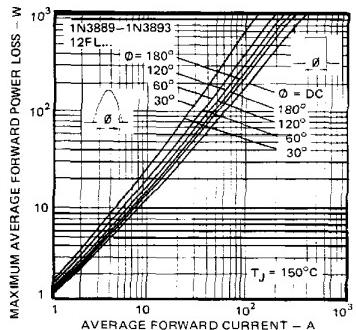


Fig. 14 — Maximum High Level Forward Power Loss Vs. Average Forward Current, 1N3889 and 12FL Series

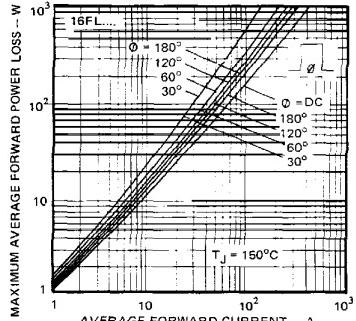


Fig. 16 — Maximum High Level Forward Power Loss Vs. Average Forward Current, 16FL Series



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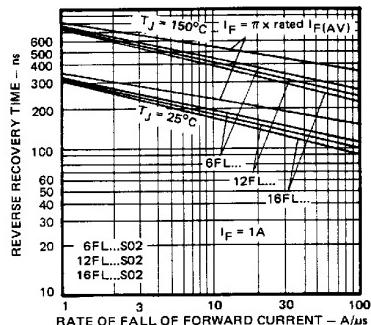


Fig. 17A — Maximum Reverse Recovery Time Vs.
Rate of Fall of Forward Current, All Series ___S02

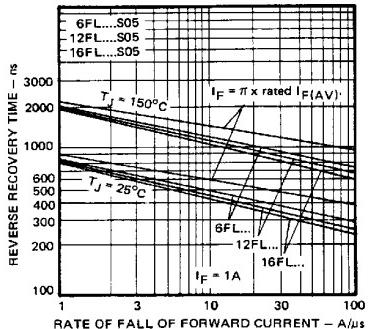


Fig. 18A — Maximum Reverse Recovery Time Vs.
Rate of Fall of Forward Current, All Series ___S05

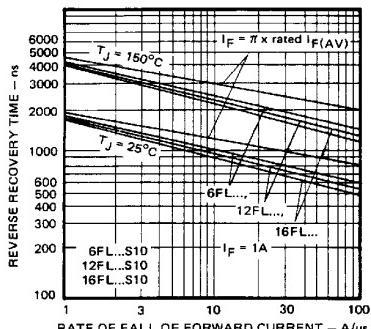


Fig. 19A — Maximum Reverse Recovery Time Vs.
Rate of Fall of Forward Current, All Series ___S10

1N3879, 1N3889, 6FL, 12FL, 16FL Series

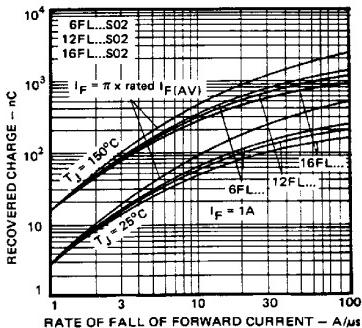


Fig. 17B — Maximum Recovered Charge Vs. Rate of
Fall of Forward Current, All Series ___S02

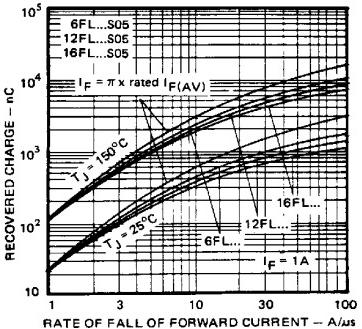


Fig. 18B — Maximum Recovered Charge Vs. Rate of
Fall of Forward Current, All Series ___S05

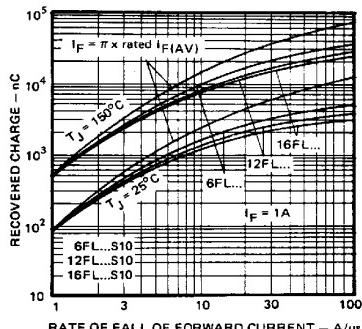


Fig. 19B — Maximum Recovered Charge Vs. Rate of
Fall of Forward Current, All Series ___S10

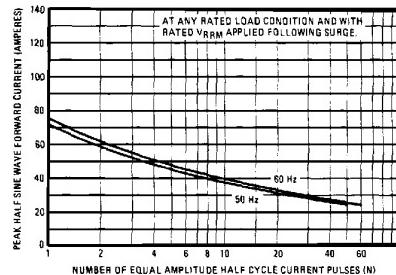


Fig. 20 — Maximum Non-Repetitive Surge Current Vs. Number of Current Pulses, 1N3879 Series

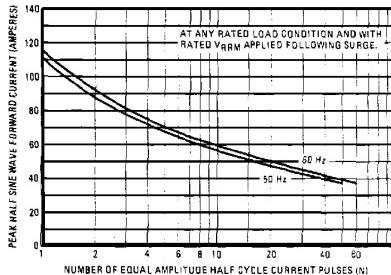


Fig. 21 — Maximum Non-Repetitive Surge Current Vs. Number of Current Pulses, 6FL Series

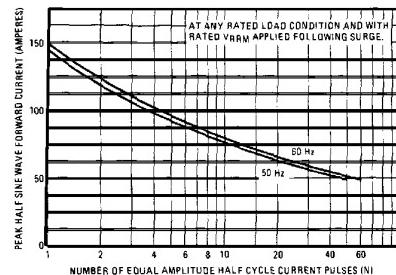


Fig. 22 — Maximum Non-Repetitive Surge Current Vs. Number of Current Pulses, 1N3889 and 12FL Series

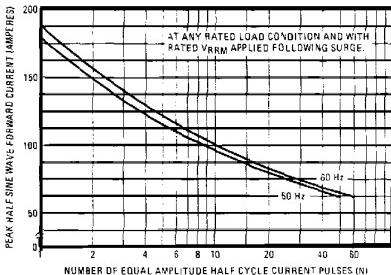


Fig. 23 — Maximum Non-Repetitive Surge Current Vs. Number of Current Pulses, 16FL Series

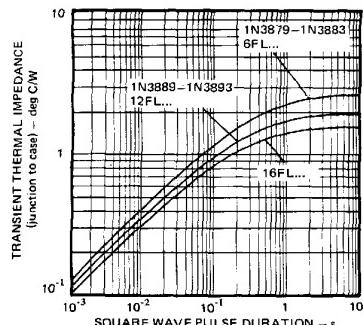


Fig. 24 — Maximum Transient Thermal Impedance, Junction-to-Case Vs. Pulse Duration, All Series.